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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,145	04/19/2005	Mats Sundberg	1734	8647
20676	7590	03/08/2006	EXAMINER	
ALFRED J MANGELS 4729 CORNELL ROAD CINCINNATI, OH 452412433			RALIS, STEPHEN J	
			ART UNIT	PAPER NUMBER
			3742	

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/510,145

Applicant(s)

SUNDBERG ET AL.

Examiner

Stephen J. Ralis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/03/2004.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority benefit of PCT Application No. SE03/00379, filed 06 March 2003, and further of Sweden Application No. 0201042-9, filed 05 April 2002.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "electrical heating element" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

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application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 7 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 7 and 9 recite the limitation "A heating element according to claim 5" in line 1. There is insufficient antecedent basis for this limitation in claim 5 (i.e. an apparatus claim should not depend from a method claim). The examiner has prosecuted claims 7 and 9 as being dependent of claim 6, hence –A heating element according to claim 6–.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1, 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schrewelius (U.S. Patent No. 2,955,145) in view of Schrewelius (U.S. Patent No. 2,992,959) and in further view of Sekhar et al. (U.S. Patent No. 5,420,399).

Schrewelius'145 discloses a molybdenum-silicide-type heating element and method of producing (column 2, lines 14-54) containing essentially of molybdenum silicide (column 1, lines 59-42; column 2, lines 1-2, 31-35) and alloys of that material, said method comprising the steps of: producing a material that contains substantially $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ by mixing a molybdenum aluminum silicide $\text{Mo}(\text{Si}_{1-y}\text{Al}_y)_2$ with SiO_2 (column 2, lines 31-36), and forming a heating element from the produced material (column 2, lines 14-70). While Schrewelius'145 is silent to the production of Al_2O_3 in addition to the $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$, examiner notes that $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$, when combined with SiO_2 and sintered, produces an Al_2O_3 product as will be shown by Schrewelius'959.

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Schrewelius'145 discloses a molybdenum-silicide-type heating element and method of producing except for wherein the product of the mixing comprises Al_2O_3 ; and wherein the SiO_2 is at least 98% pure.

Schrewelius'959 teaches a method of producing a molybdenum-silicide-type heating element in which a Al_2O_3 product is formed via the chemical reaction to form a ceramic glass component that efficiently stops the grain growth of the silicide at high temperatures (column 5, lines 69-75; column 6, lines 1-7), protecting against further oxidation (column 8, claim 2), thereby increasing the operational life of said heating element.

Sekhar et al. teach a method of producing a heating element utilizing pure SiO_2 to reduce the impurities in the resulting heating element, increasing the working temperature of the heating element (column 16, lines 12-20), thereby producing a more efficient heating element.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the molybdenum-silicide-type heating element and method of producing of Schrewelius'145 with the teaching of the production of Al_2O_3 in addition to the $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ of Schrewelius'959 to form a ceramic glass component that efficiently stops the grain growth of the silicide at high temperatures, protecting against further oxidation (column 8, claim 2), thereby increasing the operational life of said heating element. It would have further been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Schrewelius'145-

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Schrewelius'959 molybdenum-silicide-type heating element and method of producing combination with the teaching of utilizing pure SiO_2 of Sekhar et al. to reduce the impurities in the resulting heating element, increasing the working temperature of the heating element, thereby producing a more efficient heating element thereof.

Schrewelius'145 further discloses wherein x lies in the range of 0.4 - 0.6; wherein x lies in the range of 0.45 - 0.55 (i.e. 0.2 - 0.6; column 1, line 69; column 4, claims 1, 3); including the step of partially substituting Re or W in the material $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ for molybdenum (i.e. W or tungsten; column 1, lines 59-72; column 2, lines 1-2; column 4, claims 1, 3).

9. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schrewelius (U.S. Patent No. 2,955,145) in view of Schrewelius (U.S. Patent No. 2,992,959) and Sekhar et al. (U.S. Patent No. 5,420,399) and in further view of Chyung et al. (U.S. Patent No. 3,725,091).

The Schrewelius'145-Schrewelius'959-Sekhar molybdenum-silicide-type heating element and method of producing combination discloses all of the limitations, as described in claim 1 of paragraph 8, except for wherein the SiO_2 is present in the mixture is a silicate and does not affect symmetry of molybdenum silicide crystal lattice; and wherein the silicate is mullite.

Chyung et al. a method for producing a heating element (column 1, lines 9-14; column 2, lines 10-16) wherein the SiO_2 is present in the mixture (column 3, lines 12-17) is a silicate mullite (i.e. mullite; $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ inherently has SiO_2 ; is used; i.e.

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high temperature applications; column 48-52) and does not affect symmetry of molybdenum silicide crystal lattice (column 2, lines 65-68; column 3, lines 1-7, lines 57-64; column 10-11, claim 9) to provide an improved cermet material of high density, low porosity, good thermal conductivity, low electrical resistivity and good strength which is compatible with both metals and ceramics in terms of thermal expansion and bonding capability, thereby producing a more efficient heating element. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Schrewelius'145-Schrewelius'959-Sekhar molybdenum-silicide-type heating element and method of producing combination with the mixture and teaching of the use thereof of Chyung et al. to provide an improved cermet material of high density, low porosity, good thermal conductivity, low electrical resistivity and good strength which is compatible with both metals and ceramics in terms of thermal expansion and bonding capability, thereby producing a more efficient heating element.

Prior Art

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,563,095 to Sundberg is a teaching of a resistance heating element comprising $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ and utilizing mullite .

U.S. Patent No. 5,750,958 to Okuda et al. is a teaching of a ceramic glow plug utilizing Re.

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U.S. Patent No. 4,749,665 to Yano et al. is a teaching of a low temperature fired ceramic with alumina and mullite..

U.S. Patent No. 4,101,724 to Heine is a teaching of a tubular shaped heating element with tapered tubular union/glow intersection.

U.S. Patent No. 4,412,123 to Ray et al. is another teaching of an electric resistance element made out molybdenum disilicide with tapered intersection portion of legs and glow zone.

U.S. Patent No. 6,723,969 to Beatson is a teaching an electrical heating element having tubular portions for cold and hot zones.

U.S. Patent No. 3,607,475 to Schrewelius is another teaching of a molybdenum disilicide combination with SiO_2 to form a heating element.

U.S. Patent No. 6,720,530 to Taniguchi et al. is a teaching of a ceramic heater with several cold/hot zone transition species.

Japanese Patent No. 05089946 A to Kawamura et al. is a teaching of an electric heating body comprising molybdenum disilicide combination with SiO_2 .

Japanese Patent No. 05315057 A to Tsuji et al. is a teaching of the manufacture of a molybdenum disilicide combination with SiO heating element.

U.S. Publication No. 2004/0056021; 2004/0094535; 2004/0156772; U.S. Patent No. 3,269,806; 4,555,358; 5,708,408; 6,562,095; 6,582,759; 6,707,016; United Kingdom Patent No. GB 795,004 and Sweden Patent No. SE 204,116 are cumulative to or less pertinent than the references relied upon above.

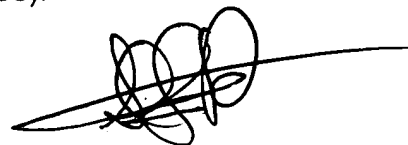
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Ralis whose telephone number is 571-272-6227. The examiner can normally be reached on Monday - Friday, 8:00-5:00.

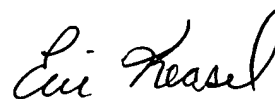
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on 571-272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Stephen J Ralis
Examiner
Art Unit 3742

SJR
March 1, 2006



Eric Keasel
Primary Examiner
Technology Center 3742